# SPEC CPU®2017 Integer Rate Result

**Fujitsu**

PRIMERGY RX2450 M1, AMD EPYC 7763 2.45 GHz

**SPECrate®2017_int_base = 824**

**SPECrate®2017_int_peak = Not Run**

<table>
<thead>
<tr>
<th>Copies</th>
<th>SPECrate 2017_int_base (824)</th>
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</thead>
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<tr>
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</tr>
<tr>
<td>502.gcc_r 256</td>
<td>566</td>
</tr>
<tr>
<td>505.mcf_r 256</td>
<td>857</td>
</tr>
<tr>
<td>520.omnetpp_r 256</td>
<td>345</td>
</tr>
<tr>
<td>523.xalancbmk_r 256</td>
<td>988</td>
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<tr>
<td>525.x264_r 256</td>
<td>1880</td>
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<tr>
<td>531.deepsjeng_r 256</td>
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<tr>
<td>541.leela_r 256</td>
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<tr>
<td>548.exchange2_r 256</td>
<td>2160</td>
</tr>
<tr>
<td>557.xz_r 256</td>
<td>488</td>
</tr>
</tbody>
</table>

## Hardware

**CPU Name:** AMD EPYC 7763  
**Max MHz:** 3500  
**Nominal:** 2450  
**Enabled:** 128 cores, 2 chips, 2 threads/core  
**Orderable:** 2 chips  
**Cache L1:** 32 KB I + 32 KB D on chip per core  
**L2:** 512 KB I+D on chip per core  
**L3:** 256 MB I+D on chip per chip, 32 MB shared / 8 cores  
**Other:** None  
**Memory:** 2 TB (32 x 64 GB 2Rx4 PC4-32000V-L)  
**Storage:** 1 x PCIe SSD, 2TB  
**Other:** None

## Software

**OS:** SUSE Linux Enterprise Server 15 SP2 (x86_64) kernel version 5.3.18-22-default  
**Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC  
**Parallel:** No  
**Firmware:** Fujitsu BIOS Version 2.1.V2 Released Oct-2021  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** Not Applicable  
**Other:** jemalloc: jemalloc memory allocator library v5.2.0  
**Power Management:** BIOS set to prefer performance at the cost of additional power usage
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PRIMERGY RX2450 M1, AMD EPYC 7763
2.45 GHz

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SPEC CPU®2017 int_base = 824
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Results Table

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<tr>
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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

The AMD64 AOCC Compiler Suite is available at http://developer.amd.com/amd-aocc/

Submit Notes

The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage, 'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

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<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>824</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 19  
**Test Sponsor:** Fujitsu  
**Tested by:** Fujitsu

Operating System Notes (Continued)

To enable Transparent Hugepages (THP) only on request for base runs,  
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.  
To enable THP for all allocations for peak runs,  
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and  
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = 
    "'/home/benchmark/speccpu-milan/amd_rate_aocc300_milan_B_lib/lib;/home/benchmark/speccpu-milan/amd_rate_aocc300_milan_B_lib/lib32:"  
MALLOC_CONF = "retain:true"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using OpenSUSE 15.2

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.  
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.  
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.  
jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)  
jemalloc 5.2.0 is available here:  
https://github.com/jemalloc/jemalloc/releases/download/5.2.0/jemalloc-5.2.0.tar.bz2

Platform Notes

BIOS configuration:  
ACPI SRAT L3 Cache As NUMA Domain = Enabled  
APBDIS = 1  
cTDP Control = Manual  
cTDP = 280  
Determinism Slider = Power  
DRAM Scrub Time = Disabled  
EDC Control = Manual  
EDC = 300  
EDC Power Limit = 300

(Continued on next page)
Fujitsu
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2.45 GHz

SPECrater®2017_int_base = 824
SPECrater®2017_int_peak = Not Run

CPU2017 License: 19
Test Date: Oct-2021
Test Sponsor: Fujitsu
Hardware Availability: Oct-2021
Tested by: Fujitsu
Software Availability: Mar-2021

Fix SOC P-state = P0
IOMMU = Enabled
L1 Stream HW Prefetcher = Enabled
L2 Stream HW Prefetcher = Disabled
NUMA Nodes Per Socket = NPS4
Package Power Limit = 280
Package Power Limit Control = Manual
SVM Mode = Disabled
SMT Control = Enabled
xGMI Link Max Speed = 18Gbps

Sysinfo program /home/benchmark/speccpu-milan/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca64d
running on localhost Fri Sep 10 03:22:53 2021

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
    model name : AMD EPYC 7763 64-Core Processor
    2 "physical id"s (chips)
    256 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following
excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 64
siblings : 128
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
53 54 55 56 57 58 59 60 61 62 63
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
53 54 55 56 57 58 59 60 61 62 63

From lscpu from util-linux 2.33.1:
    Architecture: x86_64
    CPU op-mode(s): 32-bit, 64-bit
    Byte Order: Little Endian
    Address sizes: 48 bits physical, 48 bits virtual
    CPU(s): 256
    On-line CPU(s) list: 0-255
    Thread(s) per core: 2
    Core(s) per socket: 64
    Socket(s): 2
    NUMA node(s): 16
    Vendor ID: AuthenticAMD
    CPU family: 25

(Continued on next page)
<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model: 1</td>
</tr>
<tr>
<td>Model name: AMD EPYC 7763 64-Core Processor</td>
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<tr>
<td>Stepping: 1</td>
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<tr>
<td>CPU MHz: 3430.598</td>
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<td>CPU max MHz: 2450.0000</td>
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<td>CPU min MHz: 1500.0000</td>
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<td>Virtualization: AMD-V</td>
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<td>L1d cache: 32K</td>
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<td>L2 cache: 512K</td>
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<td>L3 cache: 32768K</td>
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<td>NUMA node0 CPU(s): 0-7,128-135</td>
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<td>NUMA node1 CPU(s): 8-15,136-143</td>
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<td>NUMA node2 CPU(s): 16-23,144-151</td>
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<td>NUMA node3 CPU(s): 24-31,152-159</td>
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<td>NUMA node4 CPU(s): 32-39,160-167</td>
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<td>NUMA node5 CPU(s): 40-47,168-175</td>
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<td>NUMA node6 CPU(s): 48-55,176-183</td>
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<td>NUMA node7 CPU(s): 56-63,184-191</td>
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<td>NUMA node8 CPU(s): 64-71,192-199</td>
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<td>NUMA node9 CPU(s): 72-79,200-207</td>
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<tr>
<td>NUMA node10 CPU(s): 80-87,208-215</td>
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<td>NUMA node11 CPU(s): 88-95,216-223</td>
</tr>
<tr>
<td>NUMA node12 CPU(s): 96-103,224-231</td>
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<tr>
<td>NUMA node13 CPU(s): 104-111,232-239</td>
</tr>
<tr>
<td>NUMA node14 CPU(s): 112-119,240-247</td>
</tr>
<tr>
<td>NUMA node15 CPU(s): 120-127,248-255</td>
</tr>
<tr>
<td>Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topext perfctr_core perfctr_nb both perfctr_llc mwaitx cpb cat13 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ipb mapping svmcall fsqsb base bmis avx2 smep bmi2 erms invpcid cmq rdt_a rsseed adx smap clflushopt clwb sha ni xsavetool xcetbxal xsaves cqm_llc cqm_occup_llc cqm_mbmm_total cqm_mbmm_local clzero irperf xsave prtl whonoinvd arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassist pausefilter pfthreshold v_vmsave_vmload vgif umip pku ospk vaes vpclmulqdq rdpid overflow_recover succor smca</td>
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From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 16 nodes (0-15)
Fujitsu
PRIMERGY RX2450 M1, AMD EPYC 7763
2.45 GHz

| CPU2017 License: | 19 |
| Test Sponsor:    | Fujitsu |
| Tested by:       | Fujitsu |

SPECrates®2017_int_base = 824
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**Platform Notes (Continued)**

| node 0 cpus: | 0 1 2 3 4 5 6 7 128 129 130 131 132 133 134 135 |
| node 0 size: | 128752 MB |
| node 0 free: | 128310 MB |
| node 1 cpus: | 8 9 10 11 12 13 14 15 136 137 138 139 140 141 142 143 |
| node 1 size: | 129018 MB |
| node 1 free: | 128637 MB |
| node 2 cpus: | 16 17 18 19 20 21 22 23 144 145 146 147 148 149 150 151 |
| node 2 size: | 129020 MB |
| node 2 free: | 128784 MB |
| node 3 cpus: | 24 25 26 27 28 29 30 31 152 153 154 155 156 157 158 159 |
| node 3 size: | 129018 MB |
| node 3 free: | 128808 MB |
| node 4 cpus: | 32 33 34 35 36 37 38 39 160 161 162 163 164 165 166 167 |
| node 4 size: | 129020 MB |
| node 4 free: | 128781 MB |
| node 5 cpus: | 40 41 42 43 44 45 46 47 168 169 170 171 172 173 174 175 |
| node 5 size: | 129018 MB |
| node 5 free: | 128749 MB |
| node 6 cpus: | 48 49 50 51 52 53 54 55 176 177 178 179 180 181 182 183 |
| node 6 size: | 128986 MB |
| node 6 free: | 128778 MB |
| node 7 cpus: | 56 57 58 59 60 61 62 63 184 185 186 187 188 189 190 191 |
| node 7 size: | 129006 MB |
| node 7 free: | 128794 MB |
| node 8 cpus: | 64 65 66 67 68 69 70 71 192 193 194 195 196 197 198 199 |
| node 8 size: | 129020 MB |
| node 8 free: | 128827 MB |
| node 9 cpus: | 72 73 74 75 76 77 78 79 200 201 202 203 204 205 206 207 |
| node 9 size: | 129018 MB |
| node 9 free: | 128848 MB |
| node 10 cpus: | 80 81 82 83 84 85 86 87 208 209 210 211 212 213 214 215 |
| node 10 size: | 129020 MB |
| node 10 free: | 128717 MB |
| node 11 cpus: | 88 89 90 91 92 93 94 95 216 217 218 219 220 221 222 223 |
| node 11 size: | 129018 MB |
| node 11 free: | 128805 MB |
| node 12 cpus: | 96 97 98 99 100 101 102 103 224 225 226 227 228 229 230 231 |
| node 12 size: | 129020 MB |
| node 12 free: | 128842 MB |
| node 13 cpus: | 104 105 106 107 108 109 110 111 232 233 234 235 236 237 238 239 |
| node 13 size: | 129018 MB |
| node 13 free: | 128840 MB |
| node 14 cpus: | 112 113 114 115 116 117 118 119 240 241 242 243 244 245 246 247 |
| node 14 size: | 129020 MB |
| node 14 free: | 128832 MB |
| node 15 cpus: | 120 121 122 123 124 125 126 127 248 249 250 251 252 253 254 255 |
| node 15 size: | 128776 MB |

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**CPU2017 License:** 19  
**Test Date:** Oct-2021  
**Test Sponsor:** Fujitsu  
**Hardware Availability:** Oct-2021

**Tested by:** Fujitsu  
**Software Availability:** Mar-2021

Platform Notes (Continued)

node 15 free: 128595 MB

node distances:

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From /proc/meminfo

MemTotal: 2113279340 kB

HugePages_Total: 0

Hugepagesize: 2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release* /etc/*version*

os-release:

NAME="SLES"

VERSION="15-SP2"

VERSION_ID="15.2"

PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"

ID="sles"

ID_LIKE="suse"

ANSI_COLOR="0;32"

CPE_NAME=cpe:/o:suse:sles:15:sp2"

uname -a:

Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020

(720aeba/1p-la956f1) x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multi-hit): Not affected

CVE-2018-3620 (L1 Terminal Fault): Not affected

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Fujitsu
PRIMERGY RX2450 M1, AMD EPYC 7763
2.45 GHz

SPECrate®2017_int_base = 824
SPECrate®2017_int_peak = Not Run

CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu

Test Date: Oct-2021
Hardware Availability: Oct-2021
Software Availability: Mar-2021

Platform Notes (Continued)

Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swaps barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Sep 10 03:20
SPEC is set to: /home/benchmark/speccpu-milan
Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme0n1p3 xfs 1.3T 46G 1.3T 4% /home

From /sys/devices/virtual/dmi/id
Vendor: FUJITSU
Product: PRIMERGY RX2450 M1
Serial: MACUxxxxxx

Additional information from dmidecode 3.2 follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:
32x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200

BIOS:
BIOS Vendor: American Megatrends Inc.
BIOS Version: 2.1.V2
BIOS Date: 08/02/2021
BIOS Revision: 5.22

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base)
 | 525.x264_r(base) 557.xz_r(base)
==============================================================================

(Continued on next page)
### Compiler Version Notes (Continued)

AMS clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

---

C++  
| 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)

---

AMS clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

---

Fortran | 548.exchange2_r(base)

---

AMS clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

### Base Compiler Invocation

C benchmarks:
- clang

C++ benchmarks:
- clang++

Fortran benchmarks:
- flang

### Base Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -DSPEC_LP64

(Continued on next page)
Base Portability Flags (Continued)

505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbnk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leea_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -Wl,-allow-multiple-definition -Wl,-mllvm -Wl,-enable-licm-vrp
-fflto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti

C++ benchmarks:
-m64 -std=c++98 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -fflto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false
-z muldefs -mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden -lamdllibm
-ljemalloc -lflang -lflangrti

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-inline-recursion=4
-Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split
-fflto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
Fujitsu
PRIMERGY RX2450 M1, AMD EPYC 7763
2.45 GHz

SPECrate®2017_int_base = 824
SPECrate®2017_int_peak = Not Run

CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu

Test Date: Oct-2021
Hardware Availability: Oct-2021
Software Availability: Mar-2021

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -z muldefs -mlllvm -unroll-aggressive
-mlllvm -unroll-threshold=500 -lamlldlibm -ljemalloc -lflang -lflangrti

Base Other Flags

C benchmarks:
-Wno-unused-command-line-argument

C++ benchmarks:
-Wno-unused-command-line-argument

The flags files that were used to format this result can be browsed at

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-MILAN-RevA.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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